

Exercise 5

(a) Let a denote any fixed real number and show that the two square roots of $a + i$ are

$$\pm\sqrt{A}\exp\left(i\frac{\alpha}{2}\right)$$

where $A = \sqrt{a^2 + 1}$ and $\alpha = \text{Arg}(a + i)$.

(b) With the aid of the trigonometric identities (4) in Example 3 of Sec. 10, show that the square roots obtained in part (a) can be written

$$\pm\frac{1}{\sqrt{2}}\left(\sqrt{A+a} + i\sqrt{A-a}\right).$$

(Note that this becomes the final result in Example 3, Sec. 10, when $a = \sqrt{3}$.)